



Evaluation the Prevalence of *Toxoplasma Gondii* between Local Cows, and its Effect to Renal and Liver Function in Salah Adeen

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Abstract

The study was conducted to evaluate the epidemiological of toxoplasma gondii in local cows in Salah Adeen, and its effect to renal and liver function. One hundred twenty six sample of serum were collected from cows n different cows farm in Salah Adeen, include Samarra (60 sample), Al-Mutasim (28 sample), Baled (23 sample) and Aldejil (15 sample), from the period between July 2019 until February 2020. The study include detection of serum anti *T. gondii* IgG antibody by using ELISA Toxoplasma IgG kit, and also determination of serum liver enzymes activity which include (Transaminases enzymes: aspartate transaminase-AST and alanine transaminase-ALT) and also the concentration of serum total protein-TP, albumin, globulin, urea and creatinine.

The results indicate that the total percentage for the prevalence of *T.gondii* between cows in Saleh Eldean was 51.58%, distributed according to the region (68.33% in Samarra, 50% in Al-Mutasim, 26.08% in Baled and 26.66 in Aldejil). While the total percentage for infection with the parasite according to the gender of animals were 58.33% (28 from 48) in male animal and 47.43% (37from 78) in female animal. The results also showed that the level of TP, Albumin, globulin were significantly higher $P \leq 0.05$ in sera of infected animals, and also the activity of liver enzymes (AST and ALT) were significantly higher $P \leq 0.05$ in sera of infected animals with *T.gondii* with no significant difference in the level of urea and creatinine in sera of infected group as compared with non-infected group as control group. From all the above results we can conclude that the prevalence of *T. gondii* was high among animal under investigation, and this infection may be effect to the physiological function especially liver function.

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Key Words: *Toxoplasma Gondii*, Liver Enzymes, Urea, Creatinine, Total Protein, Albumin.

DOI Number: 10.14704/nq.2021.19.9.NQ21143

NeuroQuantology 2021; 19(9):110-116

Introduction

One of the chief public health anxiety, and life-threatening for humans and animals is parasitic disease known as Toxoplasmosis, in which the causative agent for the disease is protozoan parasite *Toxoplasma gondii*-*T. gondii*, which exceedingly convey worldwide (Buxton *et al.*, 2007; Abbas *et al.*, 2019). A broad range of warm blooded

animals and humans are infected with *T. gondii*. The way of transportation infection was unknown till the role of cat as ultimate host for parasite and its capability in shedding oocysts was discovered (Buxton *et al.*, 2007; Afonso *et al.*, 2017; Robert, 2012).

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Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Received: 12 July 2021 **Accepted:** 23 August 2021



So cattle (Cows, sheep and goats) can be infected with the parasite by ingesting oocysts from water or animal feed contaminated with cat feces infected with the parasite, this infection with the parasite may be cause economic losses due to the abortion and fetal death (Garcia *et al.*, 2012; Pavlovic *et al.*, 2007).

The focal part in the lifetime of *T. gondii* is the oocysts, which be infective to a great set of warm-blooded intermediate hosts after maturation (sporulation) if ingested (Dubey, 2010). Bradyzoites and tachyzoites are the other infective phase. In which tachyzoites foray the host cells after infection and multiply in it (Schlüter *et al.*, 2014). Bradyzoites and tachyzoites are the other infective phase. In which tachyzoites foray the host cells after infection and multiply in it, after several chains of replication, the *T.gondii* will be able to make bradyzoites in intracellular tissue cysts (Schlüter *et al.*, 2014; Watts *et al.*, 2015). Tissue cyst were found in organs and cell types, in retina, brain tissue, skeletal and cardiac muscle of the infected intermediate hosts, and also this tissue cyst maybe developed in visceral organs such as Kidneys, Lung, liver and also in neural (Schlüter *et al.*, 2014; Dubey, 1988). So it's may effect to the physiological function of this organs especially the renal and liver functions. The current paper aimed to evaluate the prevalence of *T. gondii* between cows in Saleh Eldean and its effects to the renal and liver functions.

Materials and Methods

- Sample collection: one hundred twenty six sample of blood were collected from cows n different cows farm in Salah Adeen, include Samarra (60 sample), Al-Mutasim (28 sample), Baled (23sample) and Aldejil (15 sample), from the period between July 2019 until February 2020. The serum samples were obtained from the blood after centrifugation at (300rpm) for (15min), and kept at (-20°C) until used for determination of the biochemical parameters under investigation.
- Methods: The present study include:
- Detection of anti *T. gondii* IgG antibody in serum by using commercially available enzyme immunoassay Toxoplasma IgG kit provided from Human company, Germany.

- Determination of serum liver enzymes activity which include (aspartate transaminase-AST, and alanine transaminase-ALT by using colorimetric methods in diagnostic kits from Randox (UK) for ASL_t and AST.
- Determination of serum total protein-TP, albumin and globulin concentration, by using enzymatic colorimetric methods in diagnostic kits from Biomaghreb (Tunisia) for TP and albumin, while Globulin concentration calculated according to the following equation:

Globulin conc.(g/dl)=TP conc. - Albumin conc.

- Determination of serum urea and creatinine concentration by using enzymatic colorimetric methods in diagnostic kits from Biomaghreb (Tunisia)
- Statistical analysis: All the data obtained from the present study were expressed as mean ± standard deviation (SD) and statistically analyzed by SPSS program, Using T-Test and the difference were consider significant at probability value ≤0.05.

Results and Discussion

The study conducted to evaluate the prevalence of *T. gondii* between cows in Saleh Eldean and its effects to the renal and liver functions, The results indicate that 65 animals from 126 were infected with *T. gondii* (51.58%), This percentage of infection was different according to the region, the high percentage was showed in Samarra 68.33% (41 animals from 60), and then 50% (14 animal from 28) in Al-Mutasim, 26.08% (6 animal from 23) in Baled and 26.66% (4 animal from 15) in Aldejil, Table 1.

Table 1. Prevalence of *T. gondii* between specimens under investigation

Area	No. of specimens tested	No. of the infected specimens	Percentage of infection %
Samarra	60	41	68.33
Al-Mutasim	28	14	50
Baled	23	6	26.08
Aldejil	15	4	26.66
Total	126	65	51.58



The results also showed that the prevalence of the parasites according to the gender were 58.33% (28 from 48) in male animal and 47.43% (37 from 78) in female animal, Table 2, While the prevalence of *T. gondii* in specimens under investigation according to residence were 59.455% (44 from 74) in animals from urban farm and 40.38% (21 from 52) in animals from rural farm, Table 3.

Table 2. Prevalence of *T. gondii* between specimens under investigation according to the gender

Gender	No. of specimens tested	No. of the infected specimens	Percentage of infection %
Male	48	28	58.33
Female	78	37	47.43
Total	126	65	51.58

Table 3. Prevalence of *T. gondii* between specimens under investigation according to residence

Gender	No. of specimens tested	No. of the infected specimens	Percentage of infection %
Urban	74	44	59.45
Rural	52	21	40.38
Total	126	65	51.58

Many researcher worldwide were interested to estimate the epidemiology of *T.gondii* between cattle (Cows, sheep and goats), in which Lahmar *et al.*, (Lahmar *et al.*, 2015) found that the prevalence of *T.gondii* between cows was 34.5% in Tunisia, In Egypt, the epidemiological study indicate that the 62% of goats were infected with the parasite and 4.1 to 26% in sheep (Al-Kappany *et al.* 2018), While the prevalence of the parasite in Ethiopia were 33.7% in sheep and 27.6% in goats (Tilahun *et al.*, 2018). Regarding Asia, seroprevalence of *T. gondii* in Pakistan were 26.2% in sheep and 42.8% in goats (Ahmed *et al.*, 2016). The prevalence rate of toxoplasmosis in Saudi Arabia, were 36.4% in sheep and 35.3% in goats (Anvari *et al.*, 2018) (Ehsan, 2011) found that the prevalence of the *T.gondii* was 6% in indigenous cattle and 26% in imported cattle, so the study recommend to so strict direction for importing cattle, While (Sakban, 2020), found that the rate of epidemiology of the parasite antibodies in meat juice of livestock were

17%, 37% of sheep and 9% of chicken in Hamdania(Iraq), and in in Al-Diwaniyah(Iraq), 22% of the local beef meat was infected with the parasite and 13.5% in imported beef meat (Hameed *et al.*, 2014), in addition to the all the above studies, Hameed *et al.*, (2014) found that the total infection was 46.29% in the Sheep Prepared to Slaughtering in Salah Adeen (61.54% in Samarra, 35.90% in Al-Mutasim, 48.49% in Al-delwea, 56% in Al-Jazera, 50% in Al-Alem and 36% in Beji).

The main source for the infection with the parasite under investigation in humans is the raw and undercooked meat which infected with the parasite, So the infection with parasite in cattle may regards as a potential risk agents for the infection in humans. So the understanding on risk agents for the contagion with toxoplasmosis in cattle and an estimate of the importance of these risk agents is fundamental to ensure safe meat (Guo *et al.*, 2015; Opsteegh *et al.*, 2016). To identify the most significant ways, this may include: cattle contagion by contaminations of the environment field or feed of the animal and water by oocyst of the parasite, or by ingestion, the infected intermediates host tissue such as rodents (Stelzer *et al.*, 2019). Many studies indicate different risk factor that effect to the infection of cattle in individual farm which include, Age, gender (in which the increased risk for the infection with *T.gondii* in male as compared with the female), Geographic and regional characteristics (which include mean rainfall, temperatures and humidity) and farm management (include the Production system, Specific farming conditions, Herd and flock size, contact with another animal such as cats, dogs.... etc (Stelzer *et al.*, 2019; Ribeiro *et al.*, 2018).

On the other hand the present study also include evaluate the effect of toxoplasmosis to the renal and liver function of the infected cows as G1 and non-infected as control group(C), by determination the levels of some biochemical parameters which include serum urea, creatinine, total protein, albumin, globulin, the activity of transaminases enzymes (AST and ALT). The results obtained were summarized in table 4.

Table 4. Levels of renal and liver parameters in sera of infected and non-infected cows

Groups Parameter	Mean ± SD		F-Value	P-Value
	Non-infected-C	Infected-G1		
Urea(mg/dl)	25.63±6.323	25.84±7.103	0.031	NS*
Creatinine (mg/dl)	1.0839±0.31379	1.1109±0.324	0.214	NS
Total protein(g/dl)	6.556±0.942	7.550±0.623	46.916	0.0001**
Albumin (g/dl)	2.818±0.326	3.024±0.387	9.677	0.002
Globulin (g/dl)	3.692±0.886	4.526±0.785	28.567	0.0001**
AST (U/L)	9.679±2.687	13.234±4.571	24.249	0.0001**
ALT(U/L)	14.143±4.580	21.324±4.669	73.278	0.0001**
Toxo IgG (IU/ml)	0.412±0.048	0.714±0.087	564.786	0.0001**

*NS=Non significant

Table 4 showed that mean±SD of the level of urea were (25.84±7.103 and 25.63±6.323) mg/dl in sera of infected and non-infected animals, (1.1109±0.324 and 1.0839±0.31379) mg/dl for serum creatinine, (7.550±0.623 and 6.556±0.942)g/dl for serum total protein, (3.024±0.387 and 2.818±0.326)mg/dl for albumin, (4.526±0.785 and 3.692±0.886) g/dl for serum globulin, (13.234±4.571 and 9.679±2.687) IU/L for serum AST activity, (21.324±4.669 and 14.143±4.580) IU/L for serum ALT, (0.714±0.087 and 0.412±0.048) IU/ml for the serum *T. gondii* antibodies (IgG) in infected and non-infected animals as control group.

The results indicate that the levels of urea and creatinine didn't show any significant change at $P \leq 0.05$ among infected and control group, Fig.1,2.

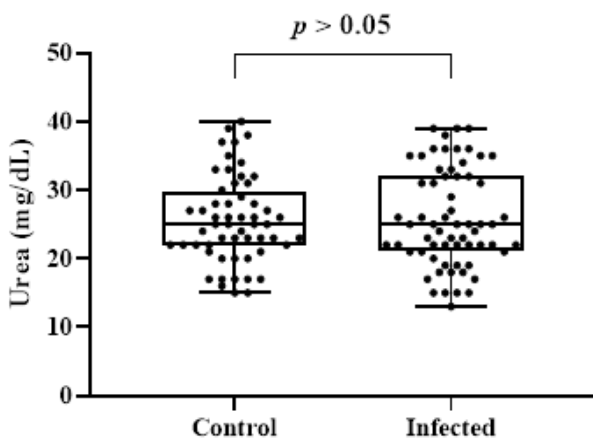


Fig. 1. Concentration of urea in sera of G1 and C

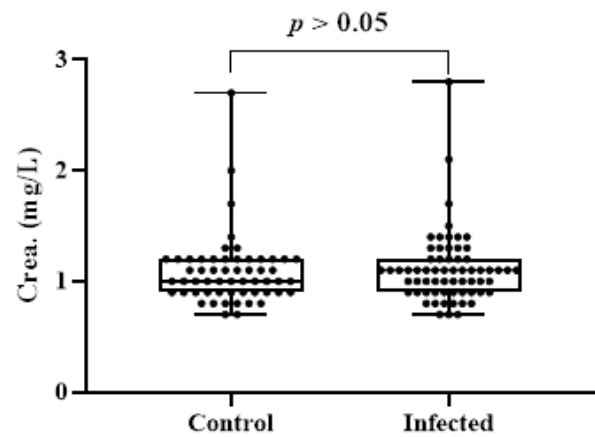


Fig. 2. Concentration of creatinine in sera of G1 and C.

Otherwise the levels of serum total protein, albumin and globulin were significantly higher at $P \leq 0.05$ in infected group comparing with control, Fig. 3,4,5

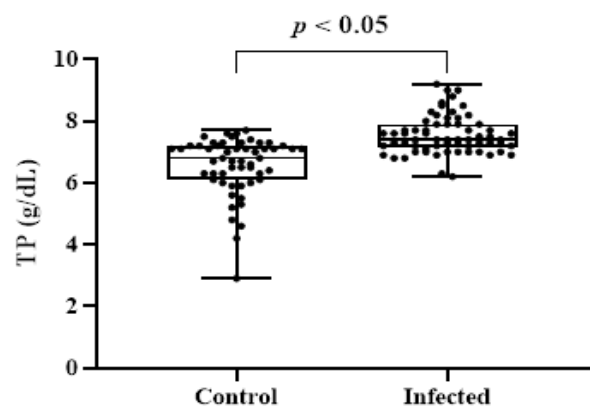


Fig. 3. Concentration of TP in sera of G1 and C.



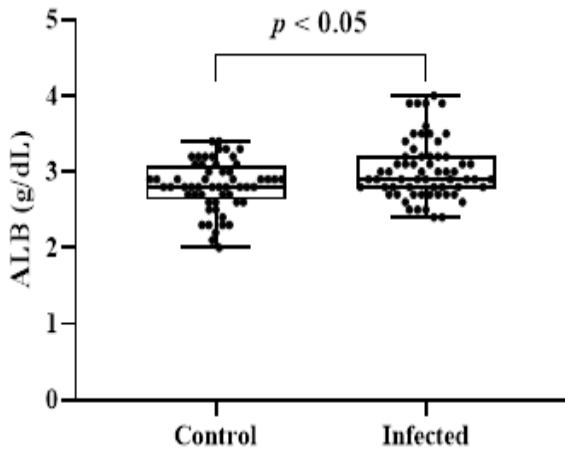


Fig. 4. Concentration of albumin in sera of G1 and C

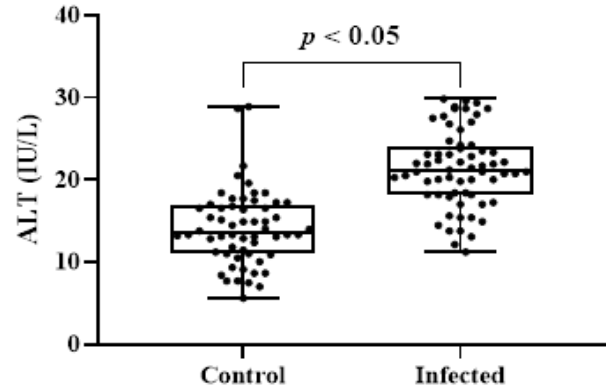


Fig. 7. Activity of ALT in sera G1 and C

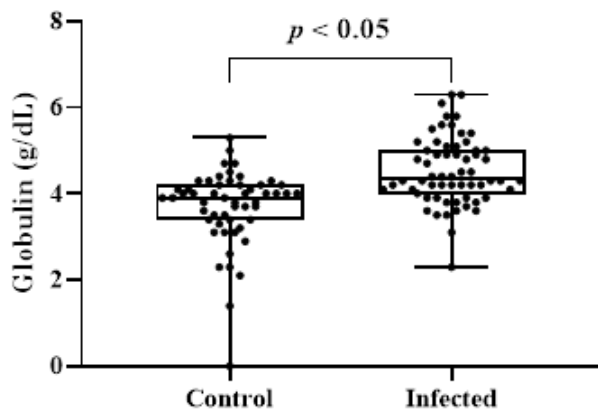


Fig. 5. Concentration of globulin in sera of G1 and C

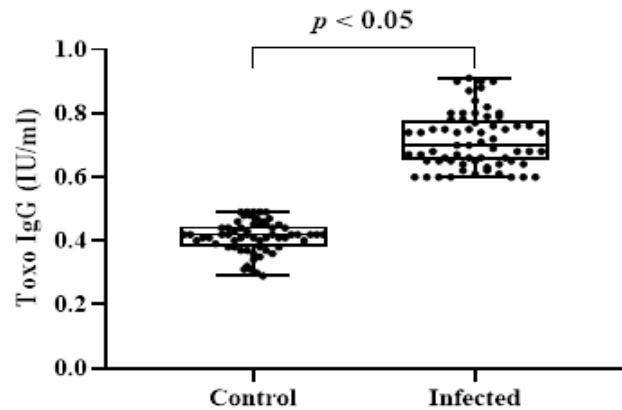


Fig. 8. Concentration of *T.gondii* IgG in sera of G1 and C.

The results in Table 4 also mark that the activity of AST and ALT were significantly higher in sera of G1 as compared with C, Fig. 6 and Fig. 7. And also the results showed that the level of parasite IgG was significantly higher $P \leq 0.05$ in G1 as compared with C, Fig.8.

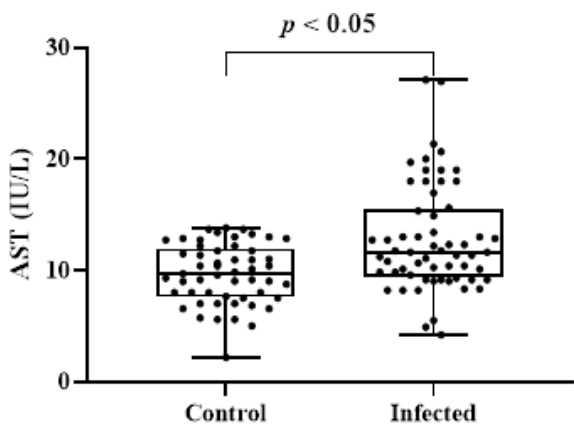


Fig. 6. Activity of AST in sera of G1 and C

The results suggest that the infection with the parasite didn't effect to the renal function, In which the level of urea and creatinine not change in sera of the infected group as compared with the non-infected, this finding were agree with the finding of Hameed *et al.*, (2014). While the results of AST was agree with finding of (Hanif, *et al.*, 2016), and also with the finding of (Hameed *et al.*, 2014) for ALT, Total protein, Albumin and globulin.

The *T.gondii* can affect the to the host's heart, lymph nodes, liver.. etc (Montoya *et al.*, 2004; Balasundaram *et al.*, 2010). The chronic and acute contagion with the parasite was related to some pathological, histological, and physiological changes including hepatitis, hepatomegaly, granuloma and necrosis (Karasawa *et al.*, 1981; Mastroianni *et al.*, 1996). The toxins secreted from the parasite cause dilation of central hepatic veins and change their permeability, and also cause hepatitis. This changes in the hepatic cells affects to the access of oxygen and nutrient material to the liver cells, all that change leads to another change which is necrosis and apoptosis (Krishna, 2004). The necrosis cause increase the activity of liver enzymes (AST and ALT), In addition to the all the effect the parasite



may be cause increase the number of macrophages and enlargement of Kupffer cells, which have a defensive role in the body (Rifaat *et al.*, 1981).

Conclusion

From the results obtained from this study, we can conclude that the prevalence of *T. gondii* was high among animal under investigation especially male more than female, This infection may be transport the parasite to human during ingestion the infected meat, and also the high prevalence infection may be have economic impact, in which cause abortion, fetal dead and also effect to the physiological function of the animal body especially the liver function.

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